



## *Naval Center for Cost Analysis*

# Impact of SECDEF Priorities on the Cost Community: Portfolio Analysis and the “Concept Decision”

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    - Capability portfolio management
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  - Requirement
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# Definition

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- Portfolio analysis is a *decision-support process* for allocating scarce resources to satisfy strategic goals
  - “A dynamic decision process”
  - “A resource allocation process”
  - “Manifestation of a business’s strategy”
- In a national security setting, this *decision-support process* needs to
  - Support all of SECDEF’s national strategic requirements
  - Consider costs, capabilities, and risks of all assets in a war fighting area

# Literature Review

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- Literature review and model search
  - DoD components and defense firms
  - Journal articles
  - Academic and Wall Street subject matter experts
- Insights
  - Many international companies attempt portfolio analysis
  - Most existing DoD models fall short
    - AoAs and campaign analyses  $\neq$  portfolio analysis
    - Other models/processes consider only a *subset* of tasks, costs, and capabilities
    - One exception is US Special Operations Command's (SOCOM's) strategy-to-task assessment model
      - But SOCOM is not in the business of major weapon system acquisition

# Background

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## **Environment**

- Uncertain and changing information
- Dynamic opportunities
- Multiple goals and strategic considerations
- Interdependence among projects
- Multiple decision-makers and locations

## **Goals**

- Value optimization
  - Return on investment
- Balance
  - Short-term versus long-term
  - High-risk versus low-risk
  - Across product categories
  - Basic research vs production
- Strategic direction
  - “On-strategy”

# Background

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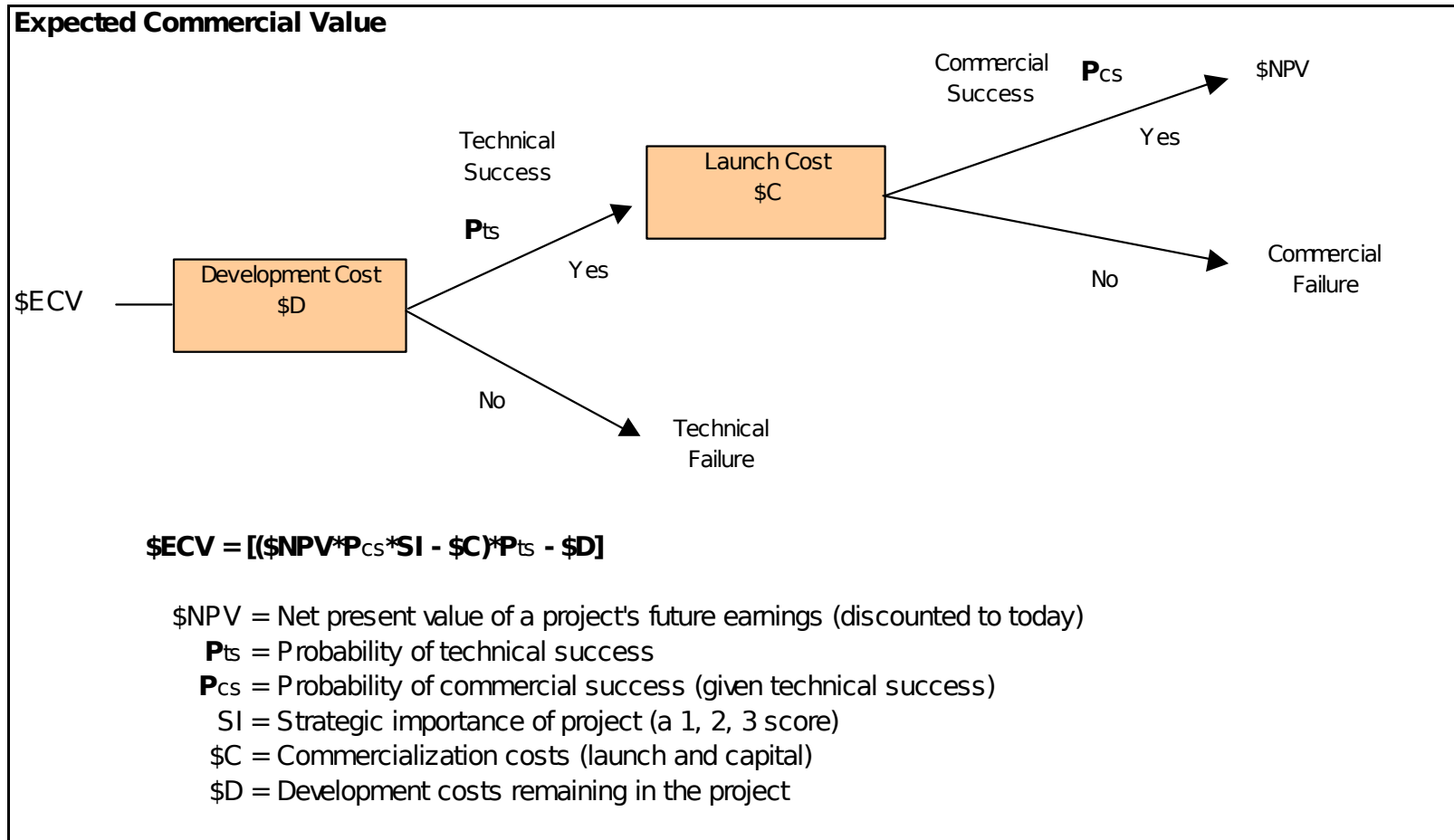
## **Common Problems**

- Portfolios do not reflect strategy
- Poor overall quality
  - New projects weak or mediocre
- Lack of focus
  - Resources wasted on the wrong projects
- “Tunnels, not funnels”
- Trivialization of product development

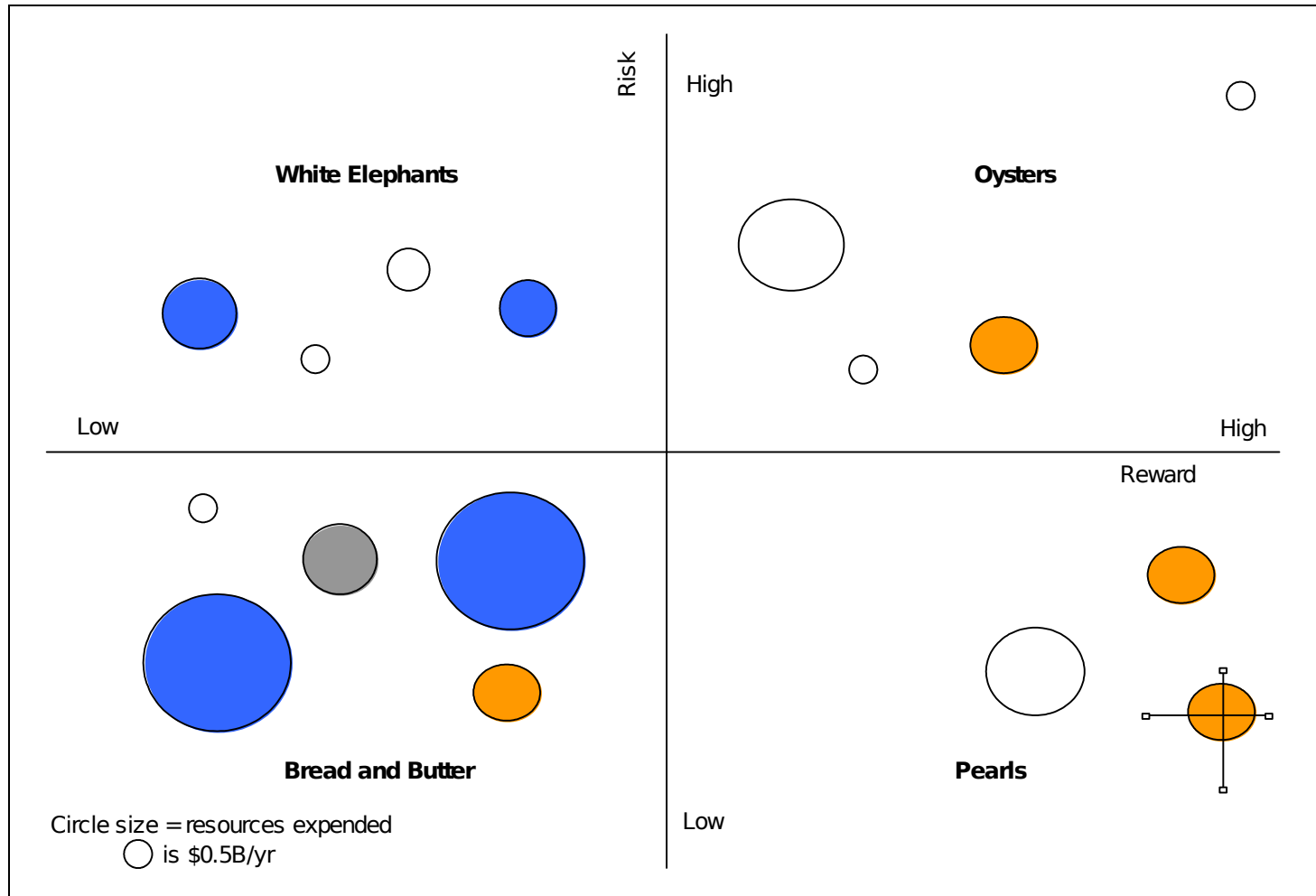
## **Best Practices**

- No magic solution
- Best practitioners
  - Use an average of 2.4 techniques (e.g., visual & scoring models)
  - Use a risk-reward bubble diagram
  - Emphasize strategy, strategy, strategy

# Expected Commercial Value



# Risk-Reward Bubble Diagram





# Approach for DoD

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- Private sector projects future costs and income flows, as well as risk
  - Models and subject matter experts (SMEs) employed
    - SMEs used to assess strategic importance and risk
- In DoD, we need to project future costs and *capability* flows, as well as risk
  - SMEs needed to assess
    - Importance of strategic, operational, and tactical tasks
    - Value of systems and platforms
    - Risk

# Expected Military Value

## Sample Theoretical Construct at a National Security Level (One of Many Possibilities)

### Expected Military Value

$$EMV = [(SI + DC) * (PPos)]$$

  
possibilities

SI Strategic importance of project

DC Degree of capability achieved

Pts Probability of technical success

Pops Probability of operational success

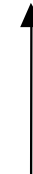
### Strategic Objectives

1. Secure US from direct attack
2. Secure strategic access & retain global freedom of action
3. Strengthen alliances & partnerships
4. Establish favorable security conditions

### Key Operational Capabilities

1. Strengthen intelligence
2. Protect critical bases of operation
3. Operate from the commons (sea, air, space, cyberspace)
4. Project & sustain forces in distant anti-access areas
5. Deny enemies sanctuary
6. Conduct network-centric operations
7. Improve proficiency against irregular challenges
8. Increase capabilities of partners

← National Defense Strategy (1 Mar 05)



# Pilot Program

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- Purpose
  - Designed to test proof of concept
- Selection of portfolio
  - Mine Countermeasure (MCM) assets
    - Endorsed by ASN(FM&C) and the Assistant Commandant of the Marine Corps
    - Sufficiently complex in detail to maximize lessons learned for later application to “bigger Navy”
      - Many individual systems
      - Multi-purpose platforms

# Mission of MCM

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- Maintain “...a credible offensive sea mining capability for strategic deterrence and force protection”
- Provide “...mine countermeasure assets ... to ensure ... the free movement of U.S. ... forces”
  - All maritime forces including Marine Corps units and logistics transport (commercial shipping and Military Sealift Command)
  - From harbors to sea lanes to logistics unloading areas to high-water mark on landing beaches

# Threat

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- Multiple potential enemies
  - 50 countries now possess sea mines
  - Terrorist groups
- Unregulated, international market
  - Mines designed, built, and sold by our friends and potential foes alike
- Asymmetric force multiplier
  - Low cost (e.g., \$1,500 Iranian contact mine damaged FFG-58 Samuel B. Roberts in 1988)
  - Sophistication, reliability, & lethality increasing rapidly
    - Stealth technology (irregular shapes, plastic)
    - Remotely controlled
    - Improved sensors and propulsion systems

# Threat

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- Asymmetric (a few examples of bottom-influence mines)
  - Sweden's ROCKAN
    - Fiberglass case
    - Anechoic and nonferrous materials (to reduce acoustic and magnetic signatures)
  - Russia's UDM
    - Remote control capability
    - Variant is the SMDM which includes a torpedo afterbody for stand-off and increased-depth capability
  - China's EM55
    - Buoyancy and rocket-propelled variants

# MCM Portfolio

## Strategic Assets

National Reconnaissance Office - Satellites  
 National Geospatial-Intelligence Agency - Digital maps  
 Defense Intelligence Agency - Human intelligence  
 Air Force B-52s and strike aircraft  
 Navy P-3s



## Dedicated Navy Assets

### Surface

Two classes  
 MCM-1 Class  
 MHC-51 Class  
 Command ship (High Speed Vessel *Swift*)  
 Systems such as SQQ-32, -32 (HFWB),  
 SLQ-37, and SLQ-38



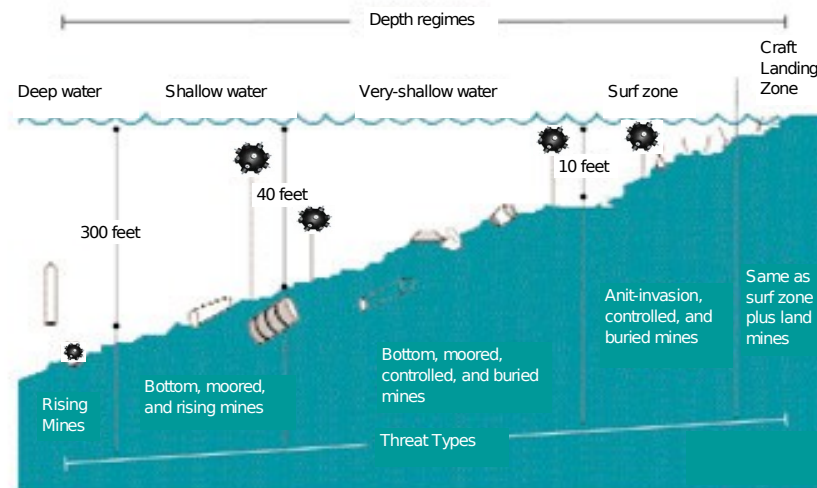
### Airborne

20 MH-53E Sea Dragons (multi-purpose)  
 -- Systems such as  
 AQS-14, AQS-20,  
 AQS-20A, AQS-24  
 Mk-103 to Mk-106



### Undersea

Explosive Ordnance Disposal (EOD)  
 Divers  
 Marine mammals



## Research and Development Program

DARPA  
 ONR - Future Naval Capability  
 Naval Surface Weapons Center - Carderock and Panama City

Basic & applied research;  
 technology demonstration

## Organic Navy Assets

### Surface

Littoral Combat Ship  
 -- Unmanned Surface Vehicle (USV)  
 with influence sweep  
 -- Vertical Take-off Unmanned  
 Aerial Vehicle with COBRA  
 -- MH-60S (see below)  
 -- Remote Minehunting System  
 -- NSCT-1 with SCULPIN



### Airborne

MH-60S Knighthawk with  
 -- Underwater towed array (AQS-20A)  
 -- Airborne Laser Mine Detection System  
 -- Airborne Mine Neutralization System  
 -- Rapid Airborne Mine Clearance System  
 -- Organic Airborne & Surface Influence Sweep



### Undersea

-- UUVs; MRUUV

### Command

-- Systems such as SYQ-13 & MEDAL

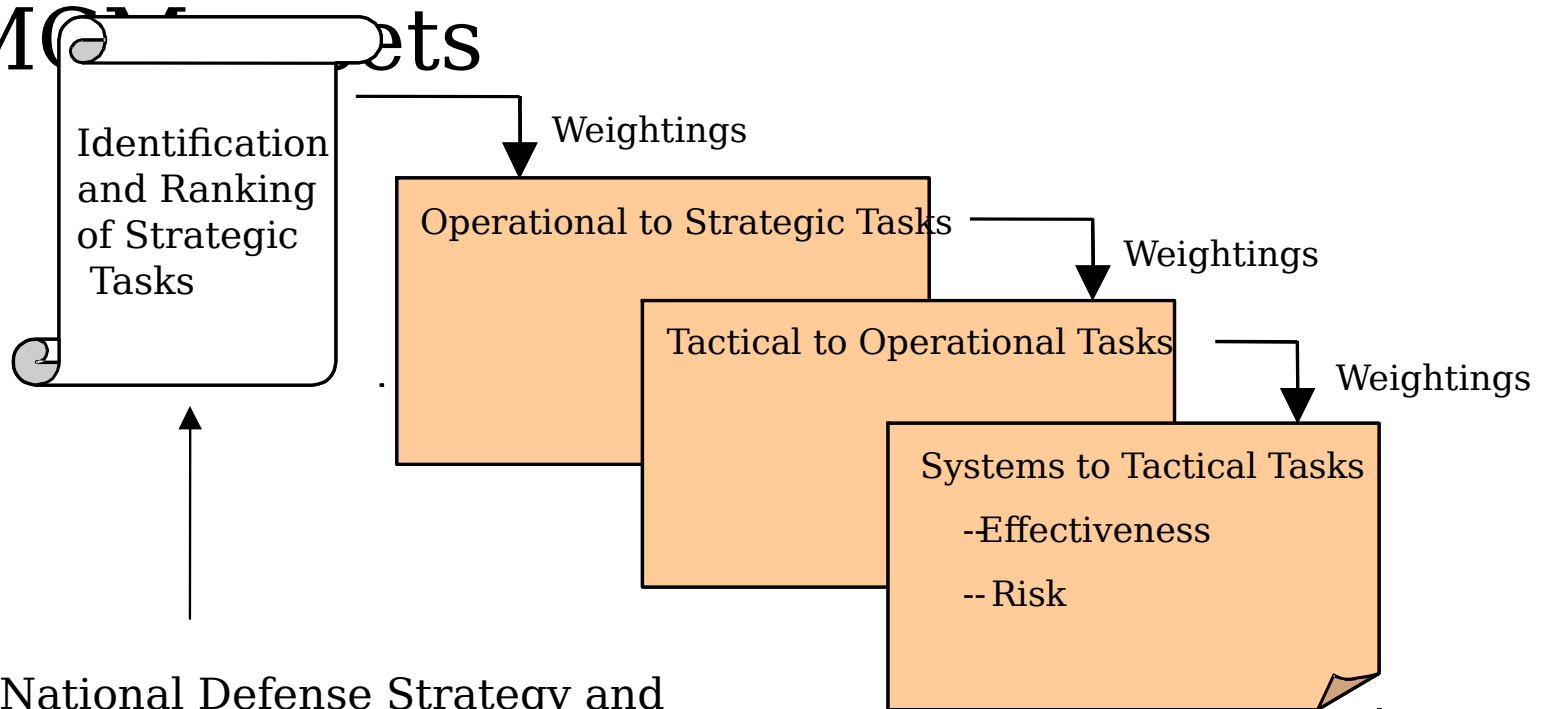
### Assault

-- Systems such as ABV & J DAM

# Design of the Scoring

- Strategy-to-systems model for

Measures



Tied to National Defense Strategy and  
Presidential Directives



# Scoring of Strategic Tasks

Strategic Tasks	Allocation/ Score
1. Protect Operating Forces Against the Threat of Sea Mines for Power Projection Ashore	15
2. Defend U.S. Ports and Coastal Approaches Against Sea Mines	50
3. Maintain Mobility of Operational Forces in Presence of Sea Mines	13
4. Collect, Analyze, and Share Intelligence Related to the Worldwide Threat of Sea Mines	10
5. Preserve Freedom of the Seas for Commercial Navigation in Presence of Sea Mines	12

Each scorer will allocate a total of 100 points among the five strategic tasks. This allows the scorers to both rank the tasks and give relative importance between them.

For instance, if 10 points are allocated to task #4 and 50 point are allocated to task #2, the scorer is saying that task #2 is 5 times as important as task #4.

# Scoring Operational Tasks

WebIQ Area: "Scoring" Session: "Portfolio Analysis Scoring Conference" - Microsoft Internet Explorer

Session Agenda Activity Participants Message Resources Help

**Operational Tasks to Strategic Tasks**

Instructions:

Online

Participation

Use the following scale to make decisions about how well each alternative is aligned with each criteria:

(1) None	(3) Essential
(2) Useful	(4) Critical

**Alternatives**

Criteria	Weights	Collect, Analyze, and Share Intelligence Related to the Worldwide Threat of Sea Mines	Defend U.S. Ports and Coastal Approaches Against Sea Mines	Maintain Mobility of Operational Forces in Presence of Sea Mines	Protect Operating Forces Against the Threat of Sea Mines in the Littoral	Preserve Freedom of the Seas for Commercial Navigation in Presence of Sea Mines
Perform Intelligence Preparation of the Battle-space	0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Conduct Q-Route Clearance	0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Conduct Port Clearance	0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Conduct Operational Area Clearance	0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Conduct Amphibious Breaching	0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Conduct Follow-On Clearance	1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Tactical to operational tasks are linked the same way.

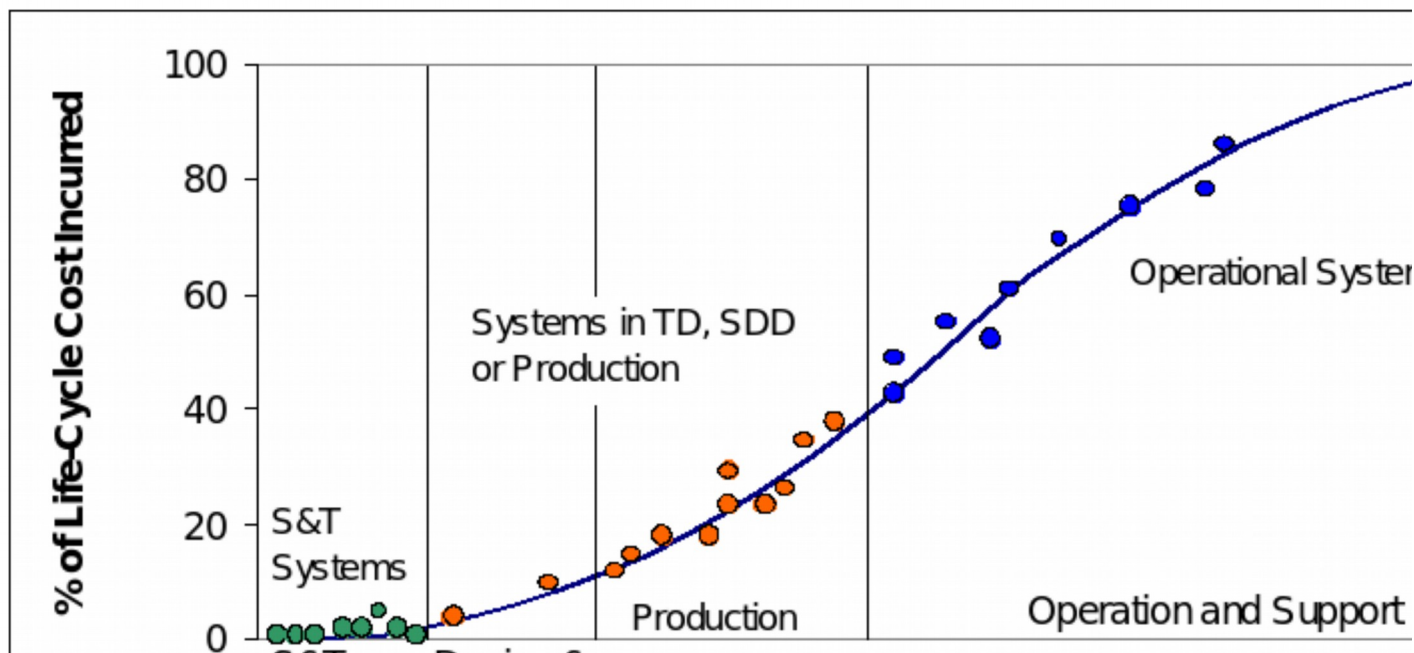
# Cost Estimating

## Scope and

- o 46 systems and 4 platforms
- o Paucity of data
  - Many small systems below radar screen of cost reporting systems
- o A dozen S&T systems

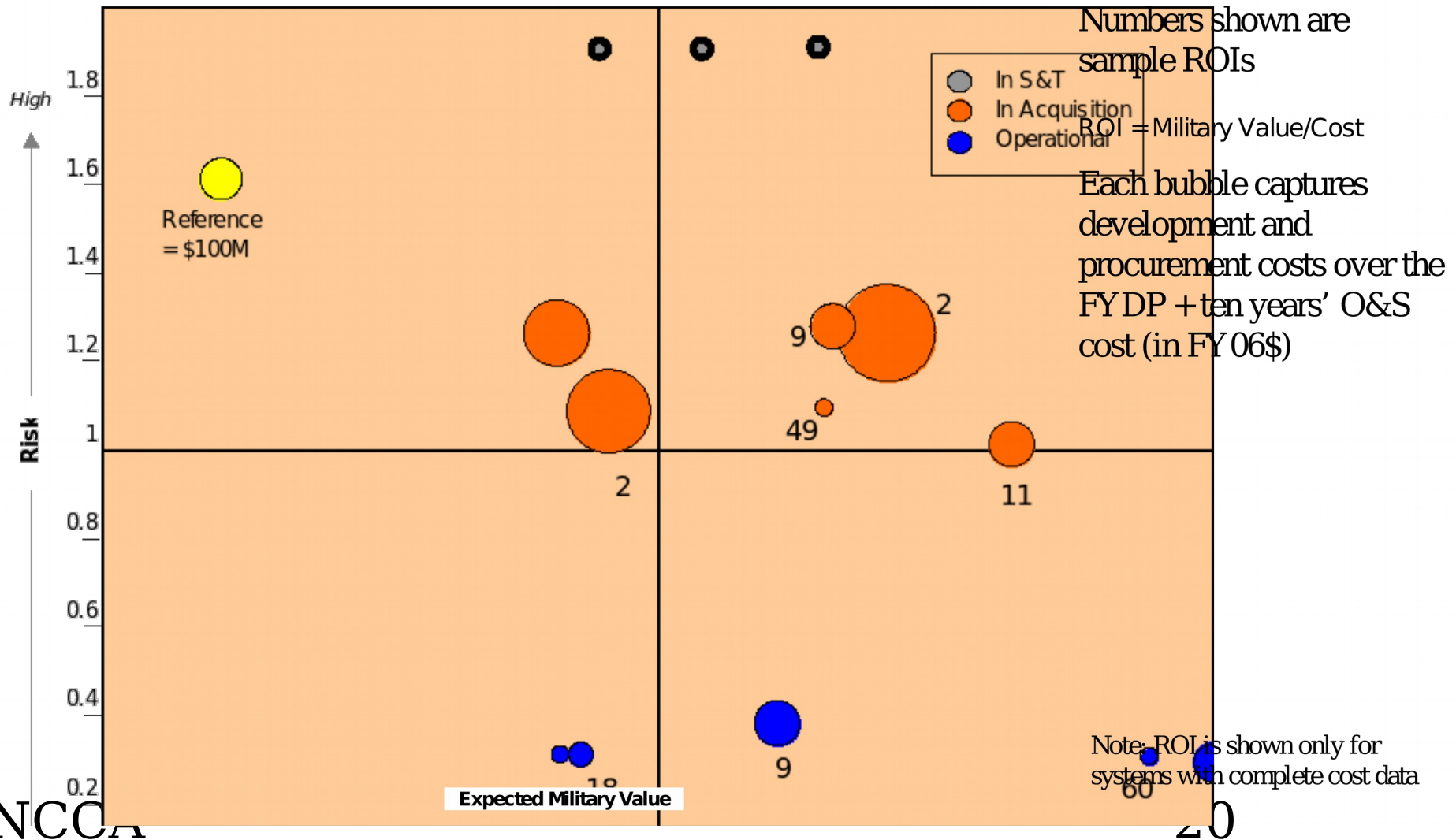
## Ground Rules &

- o Generate ROM estimates in FY06\$
- o Estimate by analogy
- o Pro-rate platform costs by mission
- o Obtain some help from OSD(CAIG) and from Navy SYSCOMs



# Value of Systems

## Detection, Localization, Classification, and Identification of Sea Mines



# DoD Transformation Priorities

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- Briefed to President Bush on 7 August 2007

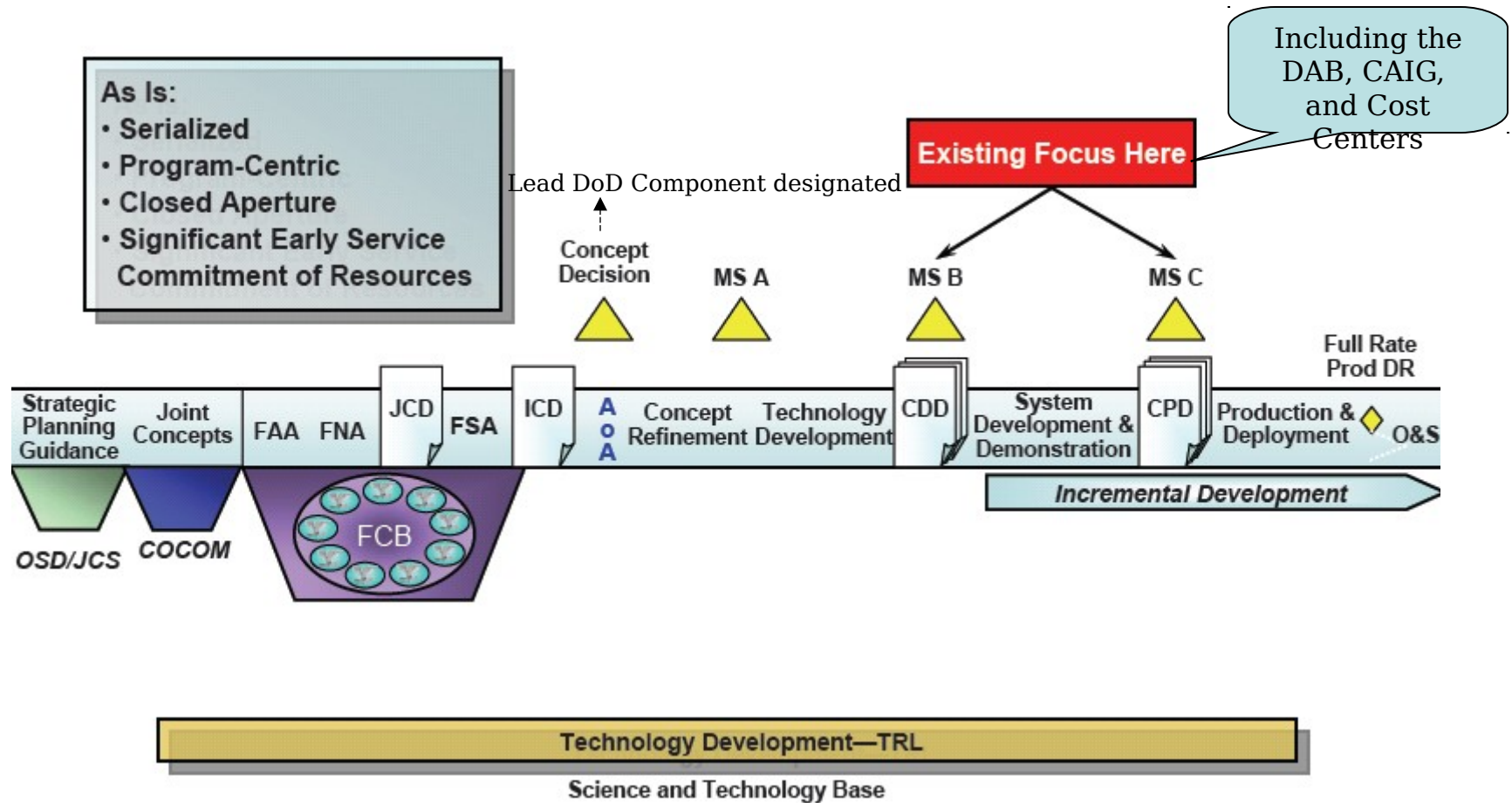


# DoD Transformation Priorities

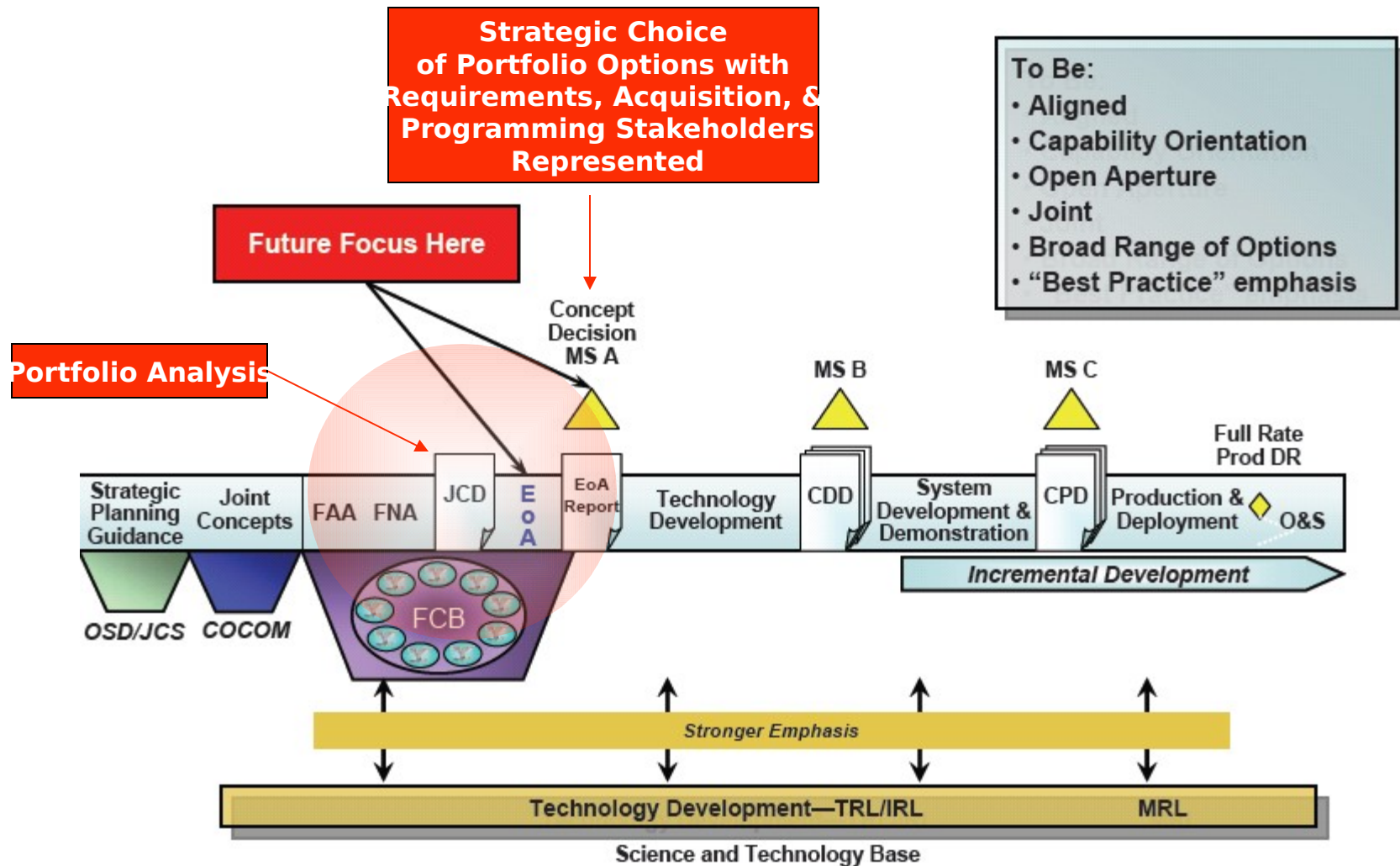
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- Two of the top five are to
  1. “Establish a **new strategic planning process** to
    - Better prioritize and align resources to **joint capability** demands
    - Implement a common, transparent decision framework
    - Expand **capability portfolio management**
  2. Pursue targeted acquisition reforms to
    - Use the **Concept Decision** [as a **strategic choice**]”

# Concept Decision: As-Is



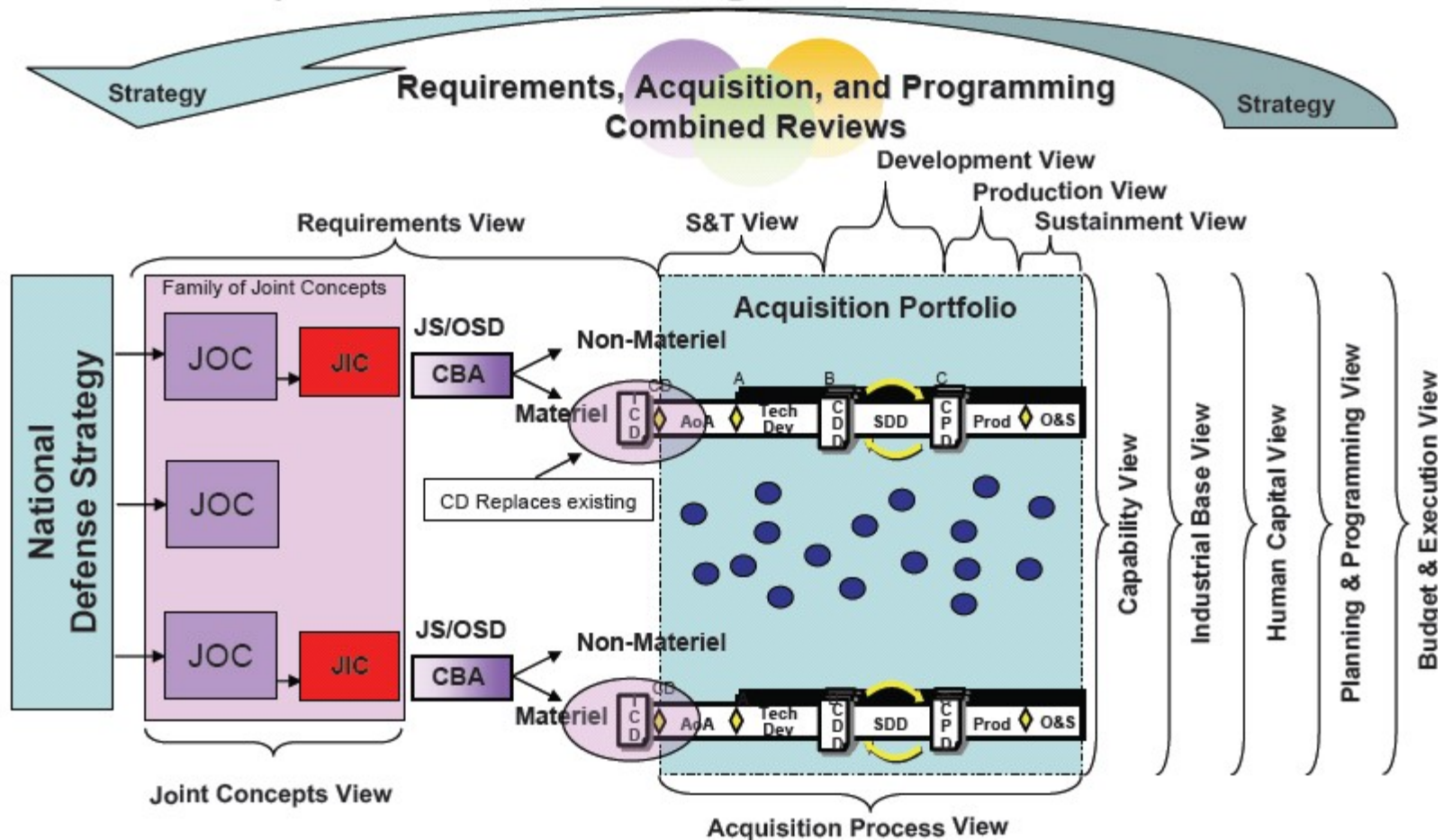
# Concept Decision: To-Be





# Holistic View

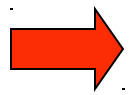
*Continuous portfolio assessment against needs and fiscal constraints*



# Potential Payoff

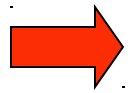
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- **Integrated investment decisions ...**
  - Focus on **portfolios** instead of **single** programs
    - Requirements, **costs**, capabilities, and risks
  - Focus on the Concept Decision
    - Point of strategic choice

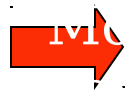


redundancies; greater system commonality; shared technologies; focus on joint warfighter

- **... made earlier in the decision process**



more time to field needed warfighter capabilities, greater advantage of S&T investments

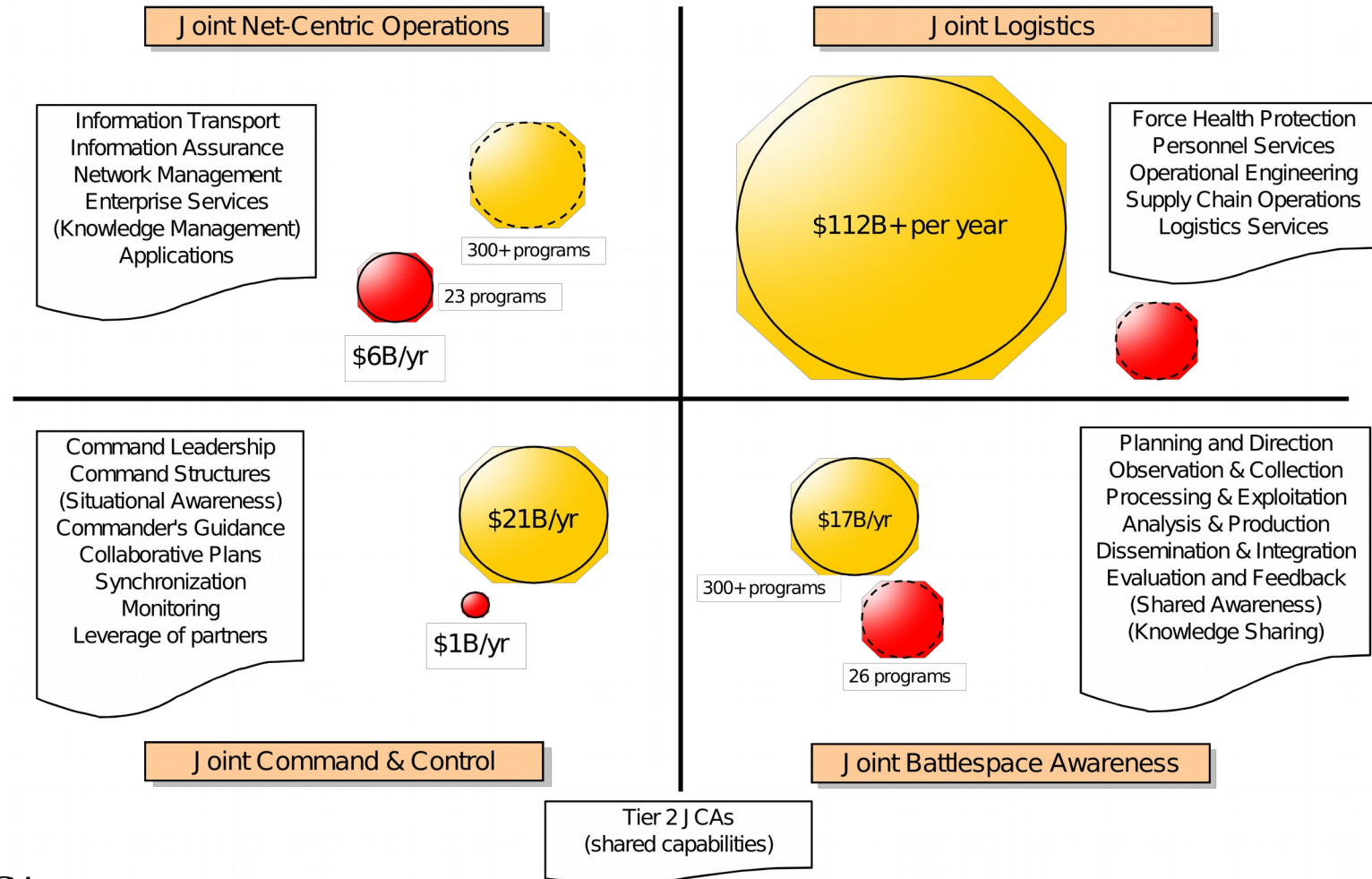


more efficient use of scarce defense resources; higher payoff to the taxpayer

# DAWG Work

**Pilots Became Permanent Efforts in July 2007**

## Scope of the DAWG Portfolios and Their Pilots



# Methodology

## Joint Net-Centric Operations

### Exploring alternative methods

Marine Corps POM analysis  
SPAWAR Systems Center - Charleston  
NCCA Pilot  
Others

## Joint Logistics

### Specific methodology to be developed

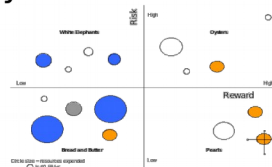
Will focus on joint force projection and sustainment  
Will also focus on processes, governance, and the appropriateness of Tier II J CAs

### Programs Tasked by DAWG to:

Develop governance structure and methodology for PR-09 & POM-10

### Exploring alternative methods

Marine Corps POM analysis  
SPAWAR Systems Center - Charleston  
NCCA Pilot  
Others



## Joint Command & Control

### Specific methodology to be developed

Loading data into J CAT  
Will attempt to "develop trade space and identify alternatives"

## Joint Battlespace Awareness

# Notional Example

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- Next two slides were briefed recently to DEPSECDEF, Vice Chairman JCS, and other members of the DAWG
- Tentative foray into portfolio analysis, based on required capabilities to support a notional MCO or stability operation



Unclassified, hypothetical  
scoring

“In defense planning, capability is defined as the enduring ability to generate a desired operational outcome or effect, and is relative to the threat, physical environment, and contributions of coalition partners.” [Through Life Capability Management Conference, London, 2007]

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Slide available upon  
request

# **Example Implementation / Execution: Who and How (Tasks & Activities) Solution Trades**

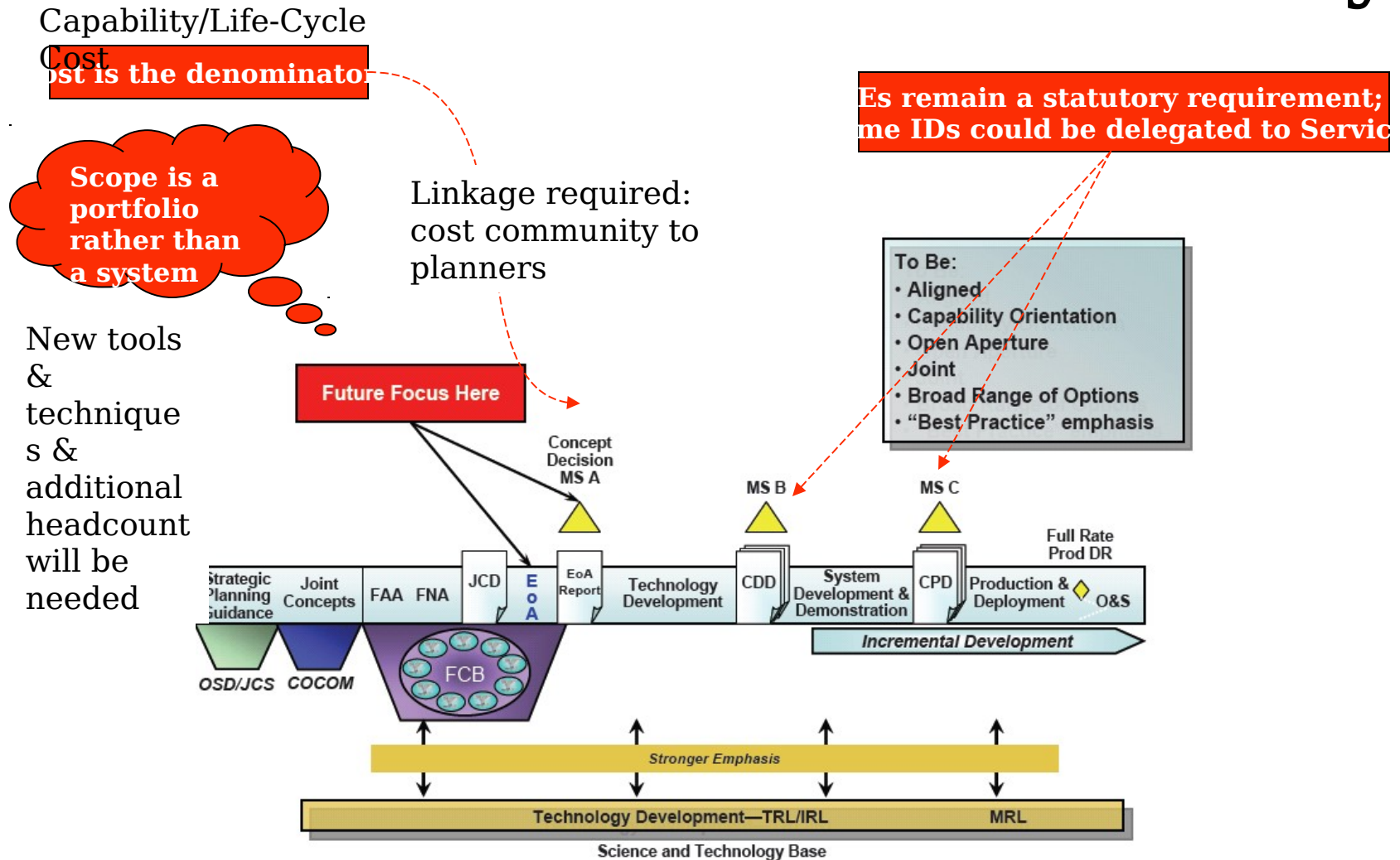
Capability Provider	Tactical Aircraft	Inventory
Navy	F/A-18E/F	558
Air Force	F-15A/B/C/D	197
Air Force	F-15E	138
Air Force	F-16	414
Air Force	F-22A	38

- ❑ Exploring the solution space:
  - Evaluate On-Hand Capability
  - Evaluate alternatives to fill gap:
    - o Increase current capability-buy more airframes
    - o Substitute alternatives
    - o Change DOT\_LPF
    - o Accept Risk
  - Present decision makers with options in terms of risk and resources
  - Execute a decision

***(Notional Example addressing a Joint Air Operations, Tactical Air Gap)***

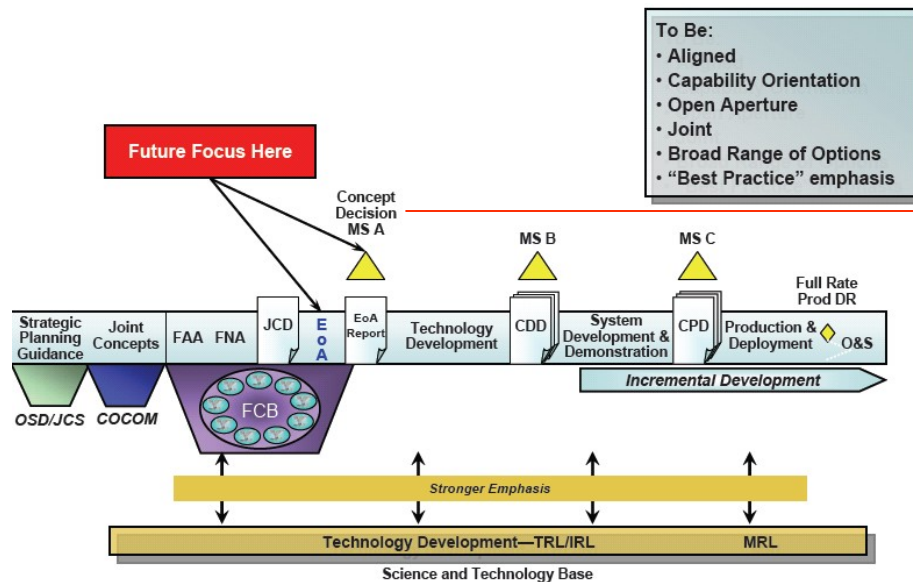


# Implications for Cost Community





# Approach



- Develop new tools and techniques
  - Hedonistic regression
  - OR techniques to help planners
  - Leverage on DASA C&E effort
- Increase visibility & availability of data
  - DoD-wide databases
  - Leverage on OSD CAIG effort
- Build libraries of cost for various portfolios such as undersea warfare
  - JCA re-baselining effort
- Establish links with AT&L and Joint Staff planners
  - Concept Decision Working Group
- Form OSD CAIG/Service working group
- Long term: institutionalize support of cost community (CJCSI 3170 & DoDI 5000.2)

# Semper Fi

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"Among the men who fought on Iwo Jima, **uncommon valor** was a **common virtue**." (Fleet Admiral Chester W. Nimitz, USN, 16 March 1945)